

the vicinity of Okalooska, La. 12th, Mansfield, O., following a heavy thunder-storm, Rocky Fork over flowed its banks and flooded lower portion of city; destructive freshets in the vicinity of Wheeling, W. Va. 31st, the Sacramento valley still remains under water, the depth of water at Sacramento City oscillating between 22 ft. 1 in. and 22 ft. 3 in. throughout the month, the southern suburb below "cross levee" and the village at Washington are still submerged; at Colusa, on the 30th, the water was still near high water mark.

Hail.—1st, Ft. McPherson, Neb.; Baxter Springs, Kan.; De Soto, Neb.; Franklin, Pa. 2nd, Sidney Bks., Neb.; Martinsville, Ill.; Milford, Ind.; Fayetteville, N. C.; Indianapolis, Ind. 3rd, Ft. McHenry, Fallston and New Market, Md.; De Soto, Neb.; Freehold and Pleasant Run, N. J.; Ardenia, N. Y.; Accotink Va.; Carlisle and Philadelphia, Pa. 4th, De Soto, Neb. 6th, Rockford, Ill.; Detroit, Mich.; Burlington, Ia.; Logansport, Ind. 7th, Baxter Springs, Kan.; De Soto, Neb.; Catawissa, Pa.; Boise City, Idaho; New London. 8th, Emerson, Neb.; Beloit, Wis.; Ft. Gibson, I. T.; Fredericksburg and Uvalde, Tex.; Duluth. 9th, Brookhaven, Miss.; Corsicana and Galveston, Tex. 10th, Kensico, N. Y. 11th, Ft. Independence, Mass.; Nora Springs, Ia.; New Bedford and Fall River, Mass.; Kensico, N. Y.; New London. 12th, Cornish, Me.; Keusico, N. Y.; Nashville. 13th, Milford, Ind.; Rowe, Mass.; Woodstock, Vt.; Mt. Solon, Accotink and Fort Whipple, Va.; Bangor and Eastport, Me. 15th, Muscatine, Ia. 16th, Chicago; Detroit. 17th, Reading, Pa. 18th, Ft. Garland, Col.; Creswell, Kan.; Somerset, Mass.; Winnemucca, Nev.; Santa Fe N. M.; New London. 19th, North Volney, N. Y. 20th, Iowa City, Ia.; Genoa, Neb. 23rd, Fort Wayne and Grand Haven, Mich. 24th, Fallston, Md.; Somerset and New Bedford, Mass. 26th, Ft. Wallace, Kan.; Fresno, Cal.; Vevay, Ind.; Independence, Kan.; Detroit. 27th, New Orleans; Vicksburg; Albany; Green Spring, Ala.; Creswell and Independence, Kan.; Brookhaven and Fayette, Miss.; Corsicana and Mason, Tex. 28th, Salt Lake City; Portsmouth, N. C.; De Soto, Neb.; Fayetteville, N. C.; Spartanburg, S. C.; Clarksville and McMinville, Tenn.; Coalville, Utah; Los Angeles, Cal. 29th, Dodge City, Kan. 30th, Camp McDermit, Nev.; Ft. Fred Steele, Wy. Ty.; Fayetteville N. C.; Cincinnati and Lewisburg, Ohio; Brownsville, Pa. 31st, Lewisburg, Ohio; Westchester and Philadelphia, Pa.; Morgantown, W. Va. At Creswell, Kan., on the 1st 2:30 p. m., a furious hail-storm from SW.; 2 inches of hail and 1.58 in. of water fell in 30 minutes.

Depth of Snow at close of Month.—On summit of Mt. Washington, 42 in.; Pike's Peak, 40 in.; Eastport, Me., 15 in.; Elmira, Ill., 1 in.; Rowe, Mass., in woods in vicinity, 6 in.; Dunbarton, N. H., snow drifts in neighboring forests; Urbana, Ohio, 1-10 in.; Catawissa, Pa., 1-10 in.; Woodstock, Vt., half of surface of ground covered.

Rainy Days.—Number of days on which rain or snow has fallen varies as follows: New England, from 8 to 23; Middle Atlantic States, from 6 to 21; South Atlantic States, from 4 to 8; Gulf States, from 4 to 9; Ohio valley, from 7 to 17; Tennessee, 10; Lower Lake region, from 15 to 23; Upper Lake region, from 9 to 18; Upper Mississippi valley, from 10 to 15; Lower Missouri valley, from 7 to 13; Rocky Mountains, 8; Pacific Coast States, from 9 to 15.

Cloudy Days.—For New England the number varies from 8 to 17; Middle Atlantic States, 4 to 13; South Atlantic States, 4 to 10; Gulf States, 2 to 10; Tennessee, 4 to 7; Ohio valley, 6 to 15; Lower Lake region, 12 to 18; Upper Lake region, 10 to 18; Northwest, 4 to 12; Rocky Mountains, 6 to 13; Pacific Coast States, 5 to 18.

RELATIVE HUMIDITY.

The average percentage of relative humidity for the month ranges about as follows: New England, from 62 at Springfield, Mass., to 75 at Wood's Holl and Eastport; Middle Atlantic States, 53 at Lynchburg to 81 at Atlantic City; South Atlantic States, 61 at Augusta to 86 at Cape Hatteras; 67 at Key West; Gulf States, 55 at Shreveport to 75 at Galveston; Ohio valley and Tennessee, 54 at Memphis to 67 at Pittsburgh; Lower Lake region, 66 at Oswego to 82 at Buffalo; Upper Lake region, 68 at Marquette to 83 at Milwaukee; Upper Mississippi valley, 57 at St. Louis to 67 at Keokuk; Red River of the North valley, 74 at Pembina to 76 at Breckenridge; Lower Missouri valley, 62 at Leavenworth to 71 at Bismarck; Western Texas, 41 at Fort Griffin to 44 at Mason; Indian Territory, 56 at Fort Gibson; western portions of Kansas and Nebraska, 54 at Dodge City to 61 at North Platte; Rocky Mountain Stations, 41 at Santa Fe to 59 at Cheyenne; Utah and Nevada, 53 at Salt Lake City to 58 at Winnemucca; Idaho, 62 at Boise City; California, 73 at Los Angeles to 79 at San Diego. The percentage at *high* stations is 65 for Pike's Peak and 86 for Mount Washington.

WINDS.

The prevailing winds at the Signal Service stations are shown by the arrows, flying with the wind, on chart No. II. The *maximum* velocities, in miles per hour, have been given in the description of the movements of low pressure areas.

Total Movements of the Air.—The following are the *largest* monthly movements as recorded at the Signal Service stations, viz.: Pikes Peak, 17,279 miles; Cape May, 13,171; Sandy Hook, 12,335; Thatcher's Island, 12,176; Cape Lookout, 12,039; Dodge City, 11,711; North Platte, 10,892; Sandusky, 10,832; Barnegat, 10,472; Kittyhawk, 10,200; Breckenridge, 10,374; Cheyenne, 10,024; Cape Henry, 9,961; Ft. Whipple, 9,704; Boston, 9,599; Eastport, 9,489; Key West, 9,015. The *smallest* are: Visalia, 1,728 miles; Deadwood, 2,156; Uvalde, 2,627; Bracketville, 3,088; Augusta, 3,155; Boise City, 3,169; Lynchburg, 3,225; Laredo, 3,364; Knoxville, 3,562; Los Angeles, 3,690; Shreveport, 3,944; Springfield, 3,990.

Local storms, tornadoes, &c., have occurred, as follows: On the 2nd, Casey Co., Ky., between 2 and 3 p. m., a severe tornado occurred, doing great damage in vicinity of Rich Hill and Mt. Olive. Its path was about 400 yards wide, and in its course swept away dwellings, large trees, horses, cattle and other stock;

seven persons were killed and several injured. 10th, about 11 a. m., a violent wind-storm, without rain, passed over Atlanta, Ga., and vicinity, filling the atmosphere with dust and doing considerable damage to buildings, fences, &c. 11th, tornado reported in vicinity of Danville, Ky. 12th, Jefferson Co., W. Va., frightful storm of hail and rain, destroying wheat, &c.; damaging buildings and killing cattle. 27th, Green Springs, Ala., tornado, blowing down trees, houses, &c.; wind at 1 p. m., SE.; at 3 p. m., SW. 28th, fifteen miles NE. of Quitman, Ga., tornado, destroying two houses; path narrow and not extending far; commenced with a southwest wind.

VERIFICATIONS.

Indications.—As worked up three times daily and carefully compared with the actual conditions during the succeeding twenty-four hours, the following results have been obtained, viz: the percentage verified averages 87.0 for New England, 88.8 for the Middle States, 87.6 for the South Atlantic States, 79.5 for the Eastern Gulf States, 81.7 for the Western Gulf States, 87.4 for Tennessee and the Ohio valley, 87.2 for the Lower Lake region, 87.4 for the Upper Lake region, 86.6 for the Upper Mississippi valley, and 84.6 for the Lower Missouri valley. For all the districts the average verified is 85.8 per cent. By elements the percentage verified averages 88.8 for the weather, 85.0 for the wind direction, 87.6 for the temperature, and 81.8 for the barometer. There were 6 omissions to predict, (5 for temperature and 1 for barometer,) out of 3,720, or 0.16 per cent. Of the 3,714 predictions that have been made 81, or 2.2 per cent., are recorded as having completely failed; 118, or 3.2 per cent., as one-fourth verified; 372, or 10.0 per cent., as one-half verified; 686, or 18.5 per cent., as three-fourths verified; 2,457, or 66.1 per cent., as fully verified.

Cautionary Signals.—The display of signals was resumed at all the Lake stations on the 15th. Out of 233 signals ordered, 191, or 82 per cent., were justified by subsequent hourly velocities of 25 miles and over at or within 100 miles of the station, but of these 21 were somewhat late; 42 signals were not justified. There were 62 cases reported from scattered stations, in which the velocity reached 25 miles or over, without the display of signals.

NAVIGATION.

Stages of water in Rivers.—In the table on the right-hand side of chart No. III are given the highest and lowest readings of the Signal Service river-gauges for the month, with the dates. The *Red* river rose steadily from the 1st to the 10th, and then fell to the close of the month. The *Arkansas*, at Little Rock, fell during the first few days, then rose to the 16th, after which it regularly fell. In the *Tennessee*, *Cumberland*, *Savannah*, *Allegheny*, *Youghiogheny* and *Monongahela* the changes were unimportant. The *Ohio*, at Pittsburgh, rose 44 inches on the 4th and 5th. At Cincinnati there was an almost constant fall from 30 ft. 10 in. the 1st to 22 ft. 8 in. the 11th, then rose to 33 ft. 5 in. by the 17th, and fell to close. At Louisville it fell from 11 ft. 20 in. the 1st to 9 ft. 9 in. the 12th; then rose to 12 ft. 4 in. the 17th, and afterwards fell. In the *Missouri* the changes were light. *Mississippi*, from St. Paul to Keokuk, the oscillations were not important. At St. Louis, rose to 17 ft. 1 in. the 6th, fell to 15 ft. 9 in. the 9th, rose to 22 ft. 10 in. by the 12th, and then fell to its minimum near close of month. At Cairo, fell from 33 ft. the 5th to 30 ft. 11th, rose to 35 ft. 9 in. by 17th, and then fell to its minimum. At Memphis, rose from 26 ft. the 1st to 26 ft. 11 in. the 8th, fell to 25 ft. 5 in. the 13th, rose to 28 ft. 8 in. the 20th, and afterwards fell. At Helena, oscillated between 35 ft. 6 in. the 14th and 37 ft. 11 in. (within 2 ft. of the danger-line,) on the 22d, and then fell to near 27 ft. the 31st. At Vicksburg, steadily rose from 1st to 25th, remained stationary to the 28th, and fell to 40 ft. 6 in. by 31st New. At Orleans the changes were very gradual.

Ice in rivers and harbors.—The following items will serve to show the condition of the rivers and harbors in this respect: The *Missouri*—Bismarck, 3rd to 5th, ice soft; 6th, breaking up, teams broke through; 8th, ice moving; 11th, river rising; 16th, ice commenced running out; 17th, clear; 18th, floating ice; 19th, clear; 20th, navigation opened. Ft. Rice, D. T., 10th, main channel filled with broken ice; 12th, ice moving; 15th, clear. Leavenworth, 27th, first boat passed up river. *Red River of the North*—Pembina, 11th, ice covered with water, crossing unsafe; 14th, breaking up; 15th, moving out; 16th, clear; 17th, full of floating ice; 18th, clear, navigation opened; 22nd, first steamer arrived. *Upper Mississippi*—St. Paul, 1st to 4th, river open, thin floating ice; Dubuque, 10th, first steamer from below, arrived; Davenport, 9th, navigation opened; Keokuk, 8th, first boat left for St. Paul. *Upper Lakes*—Duluth, 17th, first arrival; 19th, first departure. Escanaba, 5th, ice moved from around docks, navigation opened, 16th, ice cleared out of bay. Northport, 5th, shore-ice left Bay; 20th, first steamer arrived. Grand Haven, 15th, "no ice in straits to prevent vessels passing through," first steamer arrived. Alpena, Thunder Bay river frozen over until 3rd; 4th to 6th, ice in river breaking up; 7th, clear; 10th, first boat arrived. Saginaw Bay, Lake Huron, 5th, ice moved out. *Georgian Bay and Lake Huron*.—8th, perfectly free of ice; navigation partly opened at Owen Sound, Georgian Bay. Detroit 7th to 8th, floating ice. Port Huron, 24th, lake navigation commenced. *Lower Lakes*—Cleveland, 1st, ice broken up on lake; 20th, navigation opened. Buffalo, 1st, harbor and lake entirely free from ice; 16th, navigation opened. Oswego, 9th, first vessel arrived. *St. Lawrence river*, 10th, free of ice from the lake to Ogdensburg. *Hudson river*—Albany, 5th, ice moving; 6th, floating ice at Rhinebeck, Barrytown, Germantown, Catskill to Stockport, and slight gorges from Stockport to Schodack; 9th, open from Albany to New York; 14th, Albany, first boat from New York arrived; 24th, shore ice formed, bays and coves frozen over. *Penobscot river*, Maine, 12th, ice out of river as far as the Narrows. *St. Croix river*, Maine, 15th, navigation opened as far as Calais. *Kennebec river*, Maine, 16th, ice jam at lower end of Swan Island broke, opening navigation to Augusta nearly a month earlier than usual. *Sebago Lake*, Maine, 31st, lower bay still covered with ice. *Mount Desert*, Maine, 18th, ice out of harbor. 19th, Pennsylvania canal, Pennsylvania, opened; Delaware and Raritan canal, New Jersey, opened.